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ABSTRACT

This is a report of a study investigating the effects and characteristics of a social network on employment by exploring all kinds of relationships centering on one person, including kinship, friendship, association, and clientship. The study focuses on comparisons of social networks associated with 100 jobs of 31 people who graduated from a training program for data processors. The dual intent of the study was to ascertain differences between the network sets of people who were satisfied or unsatisfied on their jobs and between sets associated with people who had stable and unstable job histories. Detailed statistical analyses accompany the text. The authors did not find expected differences between happily and unhappily employed people. The study also concludes that sets associated with jobs found by informal contacts are different from those jobs found through institutional contact or personal public knowledge. There were no significant differences between sets for those with "chaotic" job leaps or "orderly" careers. The report contains a 53-item bibliography and the Minnesota Satisfaction Questionnaire. (NH)

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SOCIAL NETWORK EFFECTS ON EMPLOYMENT

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Introduction. This research conducted to investigate the effects of social network on employment. We knew through social scientific observation that many people get their jobs through "friends and relatives," and that many people cite their relations with people at work as one reason for job satisfaction. However, we did not know in any precise way how these relationships that bear upon employment are structured. Nor did we know whether successfully employed persons build up and utilize a network that protects them from adversity, or whether they are "successful" because they happen into a network that can be so utilized. These networks of relationships were the focus of this research.

A personal social network in this context is a set of all kinds of relationships centering on one person, including relationships of kinship, friendship, association, clientship.

The major task of this research was to describe some characteristics of the personal social networks of people with different work experience. One area of concern was the possible differences between network sets surrounding people who are satisfied with their employment and those sets surrounding people who are not satisfied. Another area of investigation dealt with possible differences between the network sets surrounding people with stable and orderly job histories and those surrounding people with unstable and chaotic job histories.

Theoretical background. This project relates to previous research into problems of unemployment, job-seeking, job satisfaction, and work histories reported in publications by Brayfield and Crockett (1955), Evan (1963), Ferman and Aiken (1964), Form and Gerschwender (1962), Freedman (1969), Garfinkle (1964), Heneman and Davis (1968), Herzberg (1957, 1966), Herzberg, Mausner and Snyderman (1959), Homans (1961), Kornhauser (1965), Landsberger (1958), Piker (1968), Reiss (1961), Roethlisberger and Dickson (1939), Roy (1952, 1953, 1954, 1960), Schwartz and Henderson (1964), Mumford (1972), Sheppard (1966), Shostak and Gomber (1964), Starcevich (1972), Tiffany, Tiffany and Cowan (1970), U.S. Department of Labor (1969, 1970a, 1970b), Warner (1947), Whyte (1946, 1955, 1961), and Wilensky (1961).

Our research relates as well to studies using the social network model to investigate other areas of social life, such as the family, urban migration, politics and the diffusion of innovations, research reported in publications by Barnes (1954, 1969), Bott (1957), Coleman (1966), Mitchell (1969), Whitten and Wolfe (1973), and Wolfe (1970). The conceptual framework of the present study depends upon such previous research and the findings of the present study contribute in a small way to our understanding of networks in social life.

Several recent studies give evidence of the importance of social networks in relation to employment, although none has deliberately studied the relationship. The Manpower Research Mongraph, Career Thresholds, in comparing employed and unemployed, white and black, students and non-students, reports: "By far the most common method used by students to find their current jobs is through friends and relatives; almost half of both white and black students cite this method" (U.S. Department of Labor/ Manpower Administration, 1970:100). Still, unemployed youths seeking work do not report using this method with anything like that frequency. "In

the case of both whites and blacks, the unemployed are placing much less reliance on friends and relatives and much more reliance on direct contacts with employers than would seem to be warranted by the experience of the employed" (1970:100). That research also notes some differences between blacks and whites with respect to their use of social networks, the former more likely than the latter having been led to their jobs by friends or relatives.

Donald Tiffany and his associates (1970), in comparing an umemployed ("work-inhibited") group with another group of steady workers, found that the work-inhibited group showed low self-esteem and did not see themselves as wanting to be affectionate and understanding toward others: "Such people as a person successful on the job, a co-worker or boss, were seen less positively by the work-inhibited. Even a person who gives good advice in getting a job was seen more positively by the employed group. Thus, for the work-inhibited, relationships with people in the work setting are not seen as being satisfying, and hence something to be avoided" (Tiffany, et.al., 1970:95). From all this we were led to expect that the networks of employed and unemployed ("work-inhibited") persons would be significantly different in character.

The importance of the sociological perspective in unemployment research, highlighted by such findings as those to which we have just referred, is recognized by Louis A. Ferman in the following observations: "(1) unemployment is not simply an economic problem but involves a number of noneconomic considerations; and (2) future research in unemployment will increasingly utilize the concepts and tools of a variety of social sciences" (Ferman, 1964:504). The social network model is a relatively new concept and network analysis a new tool which promises to clarify some important issues, such as the forces impinging on persons from informal relationships and from interinstitutional connections. The theoretical bases and methodological innovations of modern anthropological network studies (distinct from the sociometry of Moreno and his followers) are discussed in several papers by the principal investigator (Wolfe 1970, and Whitten and Wolfe 1973), and by others (Mitchell, 1969).

Previous research experience and findings suggest that some people seem always able to find a job even when others are unemployed. This was the case, for example, in a study of white urban poor in St. Louis (Wolfe et.al., 1968). Such people usually find their jobs through "relatives and friends"--personal social networks--rather than through formal employment institutions, public or private. More accurate knowledge of how this is done, of the characteristics of job locating networks, of the ways in which some people use their networks toward such ends, should make it possible to help those who have not been able to use these networks similarly.

Going deeper into the relationship between social network and employment status, we suspected that one's network was relevant not only to finding a job but relevant also to satisfaction with the job. One who is working with "relatives and friends," with members of his personal social network, might more likely be comfortable in his work. The literature suggests that this particular question has not been looked into in sufficient depth (Behling, et.al., 1968; Freedman, 1969; House, et.al.,1967; Lindsay, et.al., 1967; Herzberg, et.al., 1959; Herzberg, 1957, 1966).

Frederick Herzberg, whose work resulted in the development of an important theoretical model for explaining job satisfaction, makes no attempt to get at the kind of network of personal relations in which we are interested. He implies that relations of a socio-technical nature have some effect on job satisfaction, but his explicit statement is that there is little evidence of the importance to job satisfaction of other kinds of personal relationships (Herzberg et.al., 1959). It was our expectation that collecting data in a different manner would reveal greater evidence of the effects of personal links other than sociotechnical ones.

When wide ranging observations have been made in work situations, instead of specific observations aimed to test particular hypotheses, the observer is more likely to discover network effects on job satisfaction. Donald Roy, for example, reported how workers in a steel fabricating plant socialized one another informally, concerning ways to outwit the time-study man (Roy, 1953, 1954). Commenting on Roy's observations William Foote Whyte noted that even in a large plant with strictly formal union-management agreements on work and hours and grievances, the way in which the union decided whether to support a worker said to be inefficient was as follows: "The shop steward consulted every member in the department of the accused worker. If there was a general agreement that the man was not pulling his load, then the steward agreed not to push a grievance..." (Whyte, 1955:156). It seemed reasonable to assume, then, that interpersonal relations influence that "general agreement," and, further, that the network of relationships both inside the plant and out has an effect on worker satisfactions. The man who has a supportive set around him, whether that set got him the job or he built the set on the job, ought to be more likely to be satisfied there than the man who has no such set.

As has just been implied these sets of personal ties are developed in part on the job, but such development may be more extensive and more rapid when a person enters a work situation already peopled with members of his own personal network set. Such questions have not been systematically explored by those studying the organization of work, whether industrial psychologists, sociologists, or anthropologists. George C. Homans noted the paucity of this sort of information when he attempted to interpret the "Electric Equipment Company Case" in the Human Group: "Thus they (the investigators) tell us only about the business contacts of the members of the upper group, and nothing about their "social" contacts. "Did the design committee ever have lunch with the design engineers?" (Homans, 1961:400-401). Homan's implication is that his interpretation of the entire social situation would be surer if such information were available. By giving explicit attention to the full social network, the project reported here intended to bring to the fore social factors which others had missed. For this reason, we gathered data not only on the frequency of interaction but data on ten other aspects of each of our respondent's relationships.

The interaction of the two processes discussed above, (1) the use of one's personal network in finding a job, and (2) the contribution of one's personal network to his job satisfaction, suggests a third area of manpower knowledge and research to which network studies are related: employment stability and the orderliness of job mobility at the societal rather than individual level. Harold Wilensky's (1961) investigation of the impact of work history on societal integration, taking cues from both

Durkheim and Mannheim, are relevant here. He found support for the general hypothesis that "Men whose careers are orderly will evidence greater vitality of primary relations (a pattern of contact with kin, friend, and neighbor which ranges into the wider community) than those whose work histories are disorderly" (Wilensky, 1961:532). While chaotic experience in the economic order fosters a retreat from both work and the larger communal life "the total participation pattern" of the person with an orderly work history is more coherent: "close friends tend to form circles and they overlap work contacts" (Wilensky, 1961:535). Our project aimed to increase our knowledge of those "circles," the "work contacts," and their "overlaps" and by doing so to put us in a better position to assess whether a satisfying and orderly work history produces social participation in the wider community or whether through participation in a wider social network one achieves a satisfying and orderly history.

A number of studies relate social participation in friendly networks both to occupational and class variables. In a review of such literature, Alan Blum (1964) cites as issues that still want empirical verification that "the working classes appear to maintain old friendships longer, and to be more resistant to new friendships than the middle classes," and the "the working classes are less likely to derive personal friendships from their contexts" (1964:198). Edward O. Laumann (1966) investigated the structuring of interaction as it relates to occupational prestige, finding that "class like features best characterize the situation at the extremes of the occupational hierarchy, while a more fluid, differentiated situation obtains for the middle levels of hierarchy" (1966:145). Differentiating between homogeneous status networks and heterogeneous status networks he proposed that "a systematic investigation of the determinates of the different types of interaction networks would be of the greatest utility in developing a more general theory of the morphology of stratification systems" (1966:145).[1] Obviously, the project reported here did not intend to develop a general theory of stratification, but intended to provide some badly needed investigation of different kinds of interaction networks and the effects of these on employment situations.

Procedures. The general design of this project was to compare subjects with respect to employment statuses and social networks. While we were not able to manipulate experimentally the "independent" variable, social network, we could compare the networks of persons who are satisfactorily employed with those of persons who are not satisfactorily employed to see whether some generalization about their relationship is justified.

The original research plan called for identification of two categories of about twenty persons each, the categories matched for age, sex, education and ethnic background, with the categories differing markedly with respect to employment status. One category was to be composed of those who showed by their involvement in an active search for employment some dis-

1. Laumann's futher work along these lines (1973) was not available to the current research until late in the project.

satisfaction with their present employment status, whether unemployed or simply not satisfied with the job they have. The other category was to be composed of those who are satisfied with their employment, evidenced at least by the fact that they are working and are not actively seeking a different job.

When the research actually began, certain adjustments had to be made in that plan. As it turned out, we used a different measure of job satisfaction than the one originally intended. Our review of the literature on job satisfaction led us to seek some information on each job in an individual's occupational history, not merely surface indicators of current satisfaction. To do this we employed the Minnesota Satisfaction Questionnaire (Lofquist, Lloyd H. and Renee V. Dawis, 1969) which, in its short form, involves asking the respondent twenty questions relating to a particular job experience. From these twenty items, three separate scores are obtainable, one each for "intrinsic" satisfaction,"extrinsic" satisfaction, and "overall satisfaction." As will be seen below, we ultimately work with these kinds of information relative to 100 jobs held by thirty persons. The jobs, and their associated networks, become the subjects of the study.

For each person in the sample the investigators collected data on his personal social network set, following techniques described by the principal investigator in previous writings (Wolfe, 1970). This demanded extended interviews with each subject. Ideally, we should have interviewed others involved in their networks but this proved infeasible in terms of time avaiable and the wide scattering of the sample in the metropolitan area.

The data collected on each link (relationship in a network) were punched on data cards according to a code adapted from the Codebook developed by the principal investigator (Wolfe, 1970). The list of variables, headed "Characteristics of Links," is presented below on page 9 of Appendix A. These data on individual links were summarized by sets so that for each person his network set at a particular time can be described in terms of a matrix of the frequencies of values on eleven variables. Sets can then be seen to differ, for example, in the interdependence of the links which make them up, in the number of communication pathways which they include, in the similarity or dissimilarity of the persons involved in them, and so forth.

Comparisons of network sets are then made by techniques worked out by the principal investigator, applying statistical tests to the data stored in a digital computer (Wolfe, 1970). Preliminary statistical comparisons were to be followed by interviews with selected subjects in order to check by a more personal case method some of the indications yielded by the statistical approach, but this follow-up was not possible as a part of the project.

The Sample. The social network sets we compared are those associated with 100 jobs of 31 people. The thirty-one people were selected by a random process from a list of 91 recent graduates of a training program for data processors and computer programmers, the list having been obtained from a local private vocational school.

Starting with such a list we knew that the people whose networks we were to compare would have at least some characteristics in common, especially characteristics directly related to jobs. Selecting randomly from

such a restricted list, we also left open the possibilities that some of these people would know one another, that their network sets would actually overlap or interlock. We were surprised that there was very little network overlap; and that relatively few of these people were actually working in the fields for which they had been trained.

Each person on the list obtained from the training institute was assigned an identification number, 00001 to 00091, and thirty-one of these numbers selected from a table of random numbers. The persons selected were then contacted by letter to prepare them for the request for an interview that was to follow. Four people could not be located and three refused to be interviewed. These seven were replaced by new names selected again at random.

Each interview required about three hours, following a schedule designed to get similiar information from each respondent on age, sex, schooling, jobs and certain information about each job, persons with whom respondent was associated on each job, household composition, ethnicity, persons with whom respondent was associated during schooling, persons helpful to respondent, persons who might seek help from respondent, kinsmen, and friends. The schedule used is reproduced as Appendix A of this report.

By these interviews we learned that our thirty-one respondents had the following characteristics:

Sex: 25 male, 6 female

Age: mean 22 years, standard deviation 2.9 yrs., with three as young as 19, 2 as old as 29.

Marital status: 20 single, 11 married and living with spouse.

Schooling: mean 13.6 yrs. (including vocational), ranging from 12 to 15.

Household composition: 2 live alone, 10 in two-person households, and 19 in larger households up to and including eight persons.

Ethnic identity: 23 expressed "no particular ethnic group" identity, 8 identified with some ethnic group (3 Black, 2 German, 1 Irish, 1 Polish, 1 Italian)

The Jobs. Our thirty-one respondents had held 100 full time jobs currently or in their recent past. These jobs and the network sets associated with them really become the subject of this report. The jobs fall into the following divisions, classified according to the Dictionary of Occupational Titles (U.S. Bureau of the Census, 1965):

Current Jobs	Total Jobs	Occupational Division	Two-digit Code
		Professional, Technical, and Managerial Occupations	
1	2	Medicine and health	07
1	1	Entertainment and recreation	15
1	3	Administrative specializations	16
1	2	Miscellaneous prof., tech., managerial	19

Current Jobs	Total Jobs	Occupational Division	Two-digit Code
		Clerical and Sales Occupations	
	1	Stenography, typing, filing	20
6	12	Computing and account-recording	21
6	18	Material and production recording	22
	2	Information and message distribution	23
	1	Miscellaneous clerical	24
	2	Salespersons, commodities	28
	3	Merchandising, except salesman	29
		Service Occupations	
	2	Comestic service	30
	0	Food and beverage preparation	31
1	1	Miscellaneous personal service	35
1	1	Building and related services	38
		Farming and Related Occupations	
	1	Plant farming	40
	1	Miscellaneous farming	42
1	1	Forestry	44
		Processing Occupations	
	1	Metal processing	50
1	2	Ore refining and foundry	51
	1	Processing of food	52
1	1	Processing of chemicals etc.	55
		Machine Trades Occupations	
1	2	Metal machinery	60
	3	Mechanics, etc.	63
	1	Printing	65
1	1	Textiles	68
		Bench Work Occupations	
1	2	Fabrication, etc., of metal products	70
	3	Fabrication, etc., of scientific, etc., apparatus	71
1	2	Assembly and repair of electrical equipment	72
1	1	Fabrication, etc. of plastics,etc.	75
		Structural Work Occupations	
	1	Structural work, metal	80
1	2	Welders, etc.	81
	1	Painting, plastering etc.	84
1	2	Construction occupations, n.e.c.	86
	1	Structural work, n.e.c.	89
		Miscellaneous Occupations	
	2	Transportation occupations, n.e.c.	91
2	6	Packaging and materials, handling	92

The 30 current jobs of these thirty-one respondents (one was still a student in a different vocational school) are distributed almost as broadly across the range of possible occupations. Despite their common training in data processing, only twelve respondents were actually working at

jobs in the computing, accounting, recording divisions (two-digit codes 21 and 22). The rest were spread in seventeen different divisions according to no obvious pattern.

The 100 jobs in which our thirty-one respondents had had experience ranged widely in terms of occupational prestige. We used a prestige scale designed by Paul Siegel (1971), which ranges potentially from 0 to 100 but pratically from shoe shiner (9), office cleaner (12), bell boy (14), up to dentist (74), lawyer (75), college professor (78) and, finally, physician (82). Our sample of jobs ranged from a low prestige score of 16 (janitor) to a high prestige score of 55 (air traffic controller). Each of these, the lowest and highest status jobs, were current jobs.

The mean prestige score representing all 100 jobs is 32, not far from the median of our sample, which is just above 29. More than half of these jobs carry prestige scores of between 23 and 35, represented by such jobs as shipping clerks, stock room clerks, sales clerks, file clerks, etc., well below most machinists, operatives, carpenters, etc.

Job Satisfaction. For each job held, each respondent was asked twenty questions relating to job satisfaction, following the Minnesota Satisfaction Questionnaire in its "short form" (Lofquist and Dawis, 1969). The twenty aspects of a job which the respondent is asked about are as follows:

MINNESOTA SATISFACTION QUESTIONNAIRE
Short Form, after Lofquist and Dawis, 1969

Code: (1) not satisfied; (2) only slightly satisfied; (3) satisfied; (4) very satisfied; (5) extremely satisfied, with this aspect of the job.

1. Being able to keep busy all the time.....1 2 3 4 5
2. The chance to work alone on the job.....1 2 3 4 5
3. The chance to do different things from time to time.....1 2 3 4 5
4. The chance to be "somebody" in this community.....1 2 3 4 5
5. The way my boss handles his men.....1 2 3 4 5
6. The competence of my supervisor in making decisions.....1 2 3 4 5
7. Being able to do things that don't go against my conscience..1 2 3 4 5
8. The way my job provides for steady employment.....1 2 3 4 5
9. The chance to do things for other people.....1 2 3 4 5
10. The chance to tell people what to do.....1 2 3 4 5
11. The chance to do something that makes use of my abilities....1 2 3 4 5
12. The way the company policies are put into practice.....1 2 3 4 5
13. My pay and the amount of work I do.....1 2 3 4 5
14. The chances for advancement on this job.....1 2 3 4 5
15. The freedom to use my own judgement.....1 2 3 4 5
16. The chance to try my own methods of doing the job.....1 2 3 4 5
17. The working conditions.....1 2 3 4 5
18. The way my co-workers get along with each other.....1 2 3 4 5
19. The praise I get for doing a good job.....1 2 3 4 5
20. The feeling of accomplishment I get from the job.....1 2 3 4 5

For each item the respondent is asked whether he was (1) not satisfied; (2) only slightly satisfied; (3) satisfied; (4) very satisfied; or (5) extreme-

ly satisfied, with the aspect of a particular job. The cumulative points for all twenty items mark a point on a scale called overall job satisfaction. The cumulative points for twelve items (1,2,3,4,7,8,9,10,11,15,16, 20) mark a point on a scale interpreted as intrinsic job satisfaction, measuring satisfaction having to do with the work itself. The cumulative points for six items alone (5, 6, 12, 13, 14) mark a point on a scale interpreted as extrinsic job satisfaction. measuring satisfaction having to do with context of the job rather than the job per se.

Relationships between Job Satisfaction and Occupational Prestige. The several dimensions of job satisfaction measured by the short form of the Minnesota Satisfaction Questionnaire are closely related to one another, but each relatively independent of occupational prestige. The zero-order correlations (Pearsonian r) found in this study, using our sample of 100 valid jobs can be seen in the following table.

	1	2	3	4
1. Occupational Prestige	x	.282	.077	.205
2. Intrinsic job satisfaction	.282	x	.657	.941
3. Extrinsic job satisfaction	.077	.657	x	.848
4. Overall job satisfaction	.205	.941	.848	x

Because of the close correlation between "intrinsic job satisfaction" and "overall job satisfaction" (r =.941) and between "extrinsic job satisfaction" and "overall job satisfaction" (r =.848), we decided to use only the "overall job satisfaction" score for most analyses.

Social Network Sets. Associated with each job identified in this study is a set of links of all kinds connecting the job-holder with any other persons during the tenure of that job. These data were gathered, in part by direct questions about co-workers, job-finding, and so forth. Such information was supplemented in open ended interviewing carried on at the same time. Whenever a social relationship was mentioned it was identified by a "link number" and characteristics of that link were recorded, including if available, date of origin of the relationship and date of termination of the relationship (or of a phase, thereof). Other characteristics are those listed on p.9 of Appendix A (dependence of this link on others, dependence of other links on this one, communication pathways, uniqueness, functional diffuseness, hierarchial status imbalance, inequality of rights and duties, external sanctions, situational contingency, structuring and frequency).

Once all the data were gathered on all the jobs of all the respondents the data on all seven hundred links were sorted into sets according to (1) respondent and (2) job (identified by dates of tenure). This sorting process was accomplished by developing a computer program we call ISETSORT (for "Individual Set Sorting").[1]

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1. For this and other computer programming, the researchers are indepted to Paul Keuler and Don Schaeffer of the Social Science Research Facility of The University of Wisconsin-Milwaukee, and to Donnie Dean of the Department of Anthropology of The University of Wisconsin-Milwaukee.

Each "respondent-job set"[2] of links can then be characterized summarily by putting the information about those eleven characteristics of each link into a matrix which has eleven columns (the characteristics) and three rows (frequency of scores on the characteristics, usually (1) low (5) moderate, (9) high). This can be illustrated for one respondent-job set:

	(1) Dependence of this link on others	(2) Dependence of other links on this	(3) Communication pathways	(4) Uniqueness	(5) Functional diffuseness	(6) Hierarchial status imbalance	(7) Inequalities of rights and duties	(8) External sanctions	(9) Situational contigency	(10) Structuring	(11) Frequency
(1)	21	11	2	16	23	25	26	11	33	21	6
(5)	11	11	23	14	8	8	7	0	0	11	3
(9)	1	11	8	3	2	0	0	22	0	20	24

Matrix 221, describing a personal network set of 33 links associated with a particular job of a particular person.

During the period that this person held this job he had thirty-three links with other people--friends, co-workers, kinsmen, all who were related to him in such a way as to come to the attention of the investigator. Of these 33 links, 21 were "low" on dependence. only 1 "high" on dependence, 11 were scored "low" on whether other links were dependent on them, 11 scored "high" on having other links dependent on them; 2 were "low" on having alternate communication pathways, while 8 were "high" in that there were many alternate pathways relevant to these relationships; 16 of these links in the set of 33 were not unique at all, while 3 links were unique for both parties (as a conjugal relationship is normally unique for both husband and wife). The frequencies in the cells for column five tell us that 23 of the links are "low" on diffuseness (which means they are uniplex, specific) and that only two links are functionally diffuse (multiplex).

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2. A "respondent-job set" is composed of the set of social relationships of one person while he holds one job. Many of these relationships are the same ones he enjoyed on an earlier job and many he will still enjoy on a future job, but some links of the set will be unique to the period of tenure of one job. Hence, "respondent-job set."

Column six reveals that this person's set contains no links that connect people of markedly different hierarchial status, and the next column reveals that most of these links involve very little inequality of rights and duties, with 26 "low" and 7 "moderate" in this respect. That two-thirds of the links in this set of 33 are governed by external sanctions is shown in column eight of the matrix, and that none of these links are seen to be situationally contingent is expressed by the frequencies in column nine. Columns ten and eleven of this matrix tell us the number of links with different degrees of structuring (for example, a supervisor/worker link is likely to be highly structured) and the number of links which are characterized by differing frequencies of interaction (6 less than 3 times a year, 24 more frequent than implied in daily co-worker relationships).

The eleven variables were not selected for this project alone, but have been selected as providing the minimally necessary nonredundant information to describe socially distinctive network sets independent of identifying subjects or of specifying content.

The intent of this kind of description is to permit ready comparison of sets through the application of mathematical procedures. One procedure for comparing entire matrices at once is a multiclassificatory chi-square procedure. We developed a computer program (MULTICHI) for this procedure as applied to network sets such as the one described. From input data consisting of any number of sets of link cards, the program draws out whichever sets it is instructed to compare and displays each set in matrix form as above. Treating the several sets to be compared as a three dimensional matrix, the computer then calculates all the possible "expected frequencies" for each cell, compares these with the observed frequencies, and calculates values of chi-square for different situations (for example, ignoring differences among variables, or ignoring differences among sets). Actually, the only chi-square value that we are interested in for this research is that which is called, in this program, total chi-square, which is the summation of the chi-square values for all the cells in our three-dimensional matrix. When comparing two sets, the more they are alike, as reflected in the frequencies of scores on the variable characteristics, the smaller will be the resultant "total chi-square." The larger the "total chi-square" value, the greater the gross differences between the two sets. We need not here be concerned about interpretations of the statistical significance of such differences because we are using this "total chi-square" only as an indicator of the gross magnitude of the differences between sets.

Findings. It should be stated at the outset that we did not find the differences in social network sets that we expected, between satisfactorily employed and unsatisfactorily employed persons. This failure to find the expected differences may be due to the fact that the population we studied is relatively homogeneous, so that their social network variation is slight. Or it may be due to the fact that a person's social network has little to do with whether or not one is happy with a particular job. Or, it may be that we haven't yet isolated those characteristics of social network links that, when properly measured and analyzed, would have the kinds of "effects" we hypothesized.

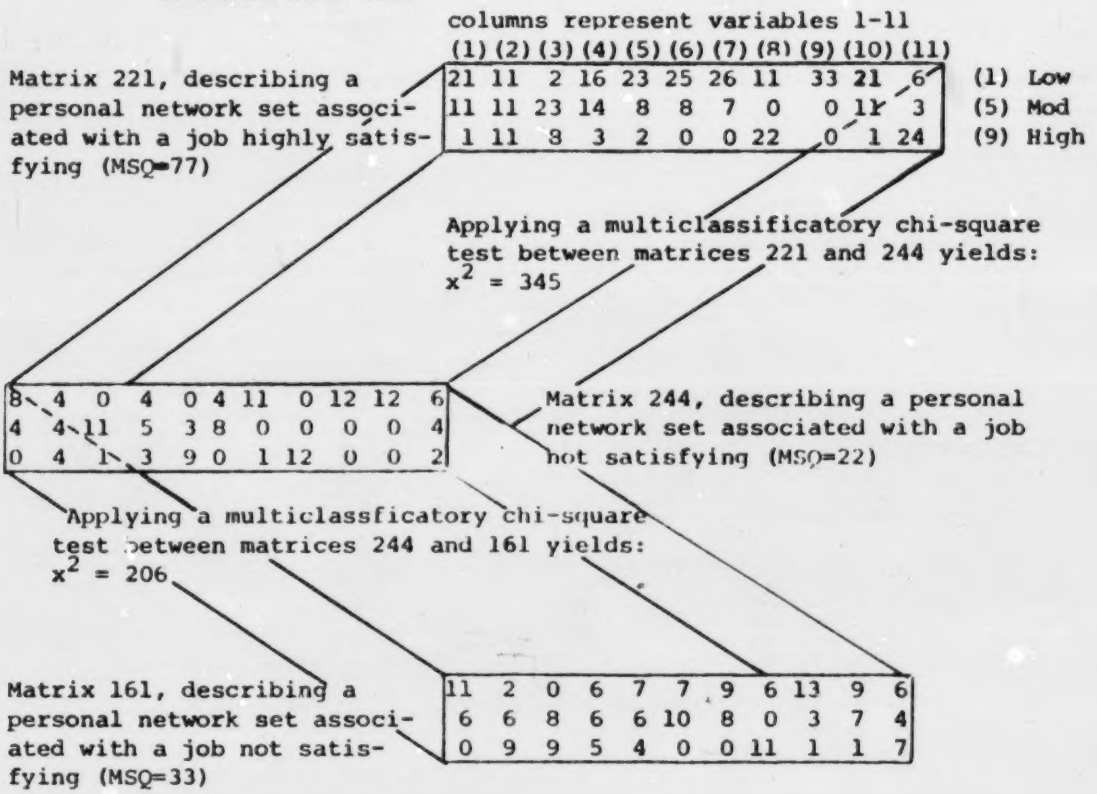
In this section are presented the findings we do have in the hope that their analysis and display may stimulate some thoughts that will have po-

tential for application to the problems of employment networks.

A. Comparing Network Sets in Relation to Job Satisfaction.

Having 100 respondent-job network sets described in the manner discussed above, there was no shortage of materials to compare. As an example of the kinds of comparisons made, and of the kinds of results we anticipated, Table 1 presents two comparisons. The first is between two sets which differ with respect to job satisfaction. Matrix 221, a set associated with a job highly satisfying with an MSQ score of 77, is compared with matrix 244, a set associated with a job not satisfying with an MSQ score of 22. The second comparison, on the same table, is between matrices 244 and 161, both refering to sets associated with jobs not highly satisfying (MSQ scores of 22 and 33 respectively).

Table 1. TWO COMPARISONS OF MATRICES, 221 COMPARED WITH 244, AND 244 COMPARED WITH 161.


columns represent variables 1-11
(1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11)
Matrix 221, describing a personal network set associated with a job highly satisfying (MSQ=77)
21 11 2 16 23 25 26 11 33 21 6
11 11 23 14 8 8 7 0 0 11 3
1 11 8 3 2 0 0 22 0 1 24
(1) Low
(5) Mod
(9) High
Applying a multiclassificatory chi-square test between matrices 221 and 244 yields: x² = 345
8 4 0 4 0 4 11 0 12 12 6
4 4 11 5 3 8 0 0 0 0 4
0 4 1 3 9 0 1 12 0 0 2
Matrix 244, describing a personal network set associated with a job not satisfying (MSQ=22)
Applying a multiclassficatory chi-square test between matrices 244 and 161 yields: x² = 206
Matrix 161, describing a personal network set associated with a job not satisfying (MSQ=33)
11 2 0 6 7 7 9 6 13 9 6
6 6 8 6 6 10 8 0 3 7 4
0 9 9 5 4 0 0 11 1 1 7

The chi-square value of 354 expressing the differences between the two sets which differ in their association with job satisfaction is higher than the chi-square value of 206 expressing the difference between the two sets which are alike in their association with low job satisfaction. However, most of the comparisons we made between sets are not as convincing as these examples given in Table 1. In fact, the chi-square figure, which gives a rough idea of how different two matrices are, tends to be about as high for pairs of sets that are both associated with high job satisfaction as it is when we are contrasting sets that are supposed to differ with respect to job satisfaction.

To see if anything more definite could be teased out of these comparisons, it was decided to form what we called "supersets"--combinations of personal social sets--one composed of sets associated with high job satisfaction and one composed of sets associated with low job satisfaction, and to compare the matrices describing these sets by the same technique. These results are shown in Table 2.

Table 2. COMPARISON OF "SUPERSETS."

columns represent variables 1-11

(1)	249	85	67	191	105	314	335	199	370	323	132
(5)	141	141	115	111	135	70	55	0	35	77	133
(9)	32	196	240	120	182	38	31	223	16	21	157

Matrix of Superset, combining personal sets associated with least satisfying jobs (MSQ range from 22 to 53)

Applying a multiclassificatory chi-square test between these matrices yields: $x^2 = 3235$

307	118	71	253	159	392	416	225	431	390	146
177	177	160	136	149	99	78	0	47	110	147
48	237	301	143	224	41	38	307	54	32	229

Matrix of Superset combining personal sets associated with most satisfying jobs (MSQ range from 54 to 89)

The high value of the chi-square total for the entire three-dimensional table (3235) suggests that these two matrices are markedly different, and that, hence, sets associated with low satisfaction ought to be significantly different from sets associated with high job satisfaction.

However, when one looks more carefully, comparing the sets with respect to one variable at a time the differences expected do not materialize strongly. One way to make such comparisons is to set up a separate table for each variable, as illustrated in Table 3:

Table 3. VARIABLE 1, "DEPENDENCE OF EACH LINK ON OTHERS"

Links:	Superset associated with Low MSQ	Superset associated with High MSQ	Total
(1) Not dependent	249	307	556
(5) "Moderately dependent"	141	177	318
(9) Dependent	32	48	80
Total	422	532	954

d.f. 2
$x^2 = 0.71$
$p > .70$ (obviously not significantly different)

When this is done for each variable, it turns out that the differences between sets are statistically significant for only four variables even at the .20 level of probability: 5, functional diffuseness; 8, external sanctions; 9, situational contigency; and 11, frequency of contact. The tables for these are given below, Tables 4-7.

Table 4. VARIABLE 5, FUNCTIONAL DIFFUSENESS.

Links:	Superset associated with low satisfaction	Superset associated with high satisfaction	Total
(1) not diffuse, specific	105	159	264
(5) moderate	135	149	284
(9) diffuse, multiplex	182	224	406
Total	422	532	954

d.f. 2
$x^2 = 3.443$
$p < .20$

There is a tendency toward a slightly greater frequency of links which are specific, uniplex, non-diffuse, in the sets associated with high job satisfaction (29%) as compared to the sets associated with low satisfaction (24%). The proportion of diffuse, multiplex links does not differ between the two kinds of sets, both having just over 42% of their links diffuse.

Table 5. VARIABLE 8, EXTERNAL SANCTIONS.

Links:	Superset associated with low satisfaction	Superset associated with high satisfaction	Total
(1) no external sanctions	199	225	424
(9) definite external sanctions	223	307	530
Total	422	532	954

d.f. 1
$x^2 = 2.254$
$p < .20$

Although the differences are slight there is a tendency toward more links with a definite external sanctions in the sets associated with high job satisfaction. Links without external sanctions are relationships that are essentially independent exchange relationships which are of little concern to others aside from the partners to the exchange. It is easy to see why a job which involves a high proportion of these might enhance feelings of dissatisfaction.

Table 6. VARIABLE 9, SITUATIONAL CONTINGENCY.

Links:	Superset associated with low satisfaction	Superset associated with high satisfaction	Total
(1) Not situationally contingent	370	431	801
(5) Moderate	35	47	82
(9) Situationally contingent	16	54	70
Total	421	532	953

d.f. 2
$x^2 = 14.27$
$p < .001$

Table 6 shows that while all sets have a preponderance of links categorized as not situationally contingent, the sets which have the greater proportion of such links (87% compared to 81%) are those associated with low job satisfaction. On the other hand, the superset associated with high satisfaction has more than 10% of its links recognized as situationally contingent, in contrast to only 3% of the links of the superset associated with low satisfaction. These situationally contingent links may represent situations where the respondent has relationships with some of the same people at work, a situation that tends to be satisfying.

Table 7. VARIABLE 11, FREQUENCY OF CONTACT.

Links:	Superset associated with low satisfaction	Superset associated with high satisfaction	Total
(1) Low frequency, less than three times a year	132	156	288
(5) Moderate frequency	133	147	280
(9) High frequency, daily more than co-worker	157	229	386
Total	422	532	954

d.f. 2
$x^2 = 3.46$
$p < .20$

Table 7 shows that there is a slight tendency for sets in which there is a high frequency of contact to be associated with high job satisfaction, but the difference is slight: 43% of the links of the superset associated with high satisfaction involve interaction more frequent than work days only, whereas the comparable figure for the superset associated with low satisfaction is 37%.

The reader may have noticed in Tables 4-7 that the size of the Superset associated with high job satisfaction is larger than the size of the Superset associated with low satisfaction. Made up of fifty sets with highest job satisfaction scores, the former has 532 non-redundant links, while the superset made up of the 50 sets with lowest job satisfaction scores has only 422 non-redundant links. There is, in fact, a slight correlation between job satisfaction and the number of links in the set associated with that job: for all 100 respondent-job sets, the Pearsonian correlation coefficient is 0.28. The variation is such, however, that it is hopeless to attempt to predict job satisfaction from knowing the number of links in a set. At least we can say that our respondents mentioned more contacts associated with jobs they have found satisfying than they mentioned in association with jobs less satisfying.

B. On finding jobs. The network sets associated with jobs found by informal contacts are more different from those associated with jobs found either by institutional contact or personal public knowledge than these latter are different from each other. That is when a person finds a job through contact with a friend or relative, the network set associated with that job is different in some way from the network sets associated with jobs found either through school or an agency or through public media.

Using the "total chi-square" measure of gross differences between sets we find the following:

	Superset associated with job:	
Superset associated with job:	Found by institution contact	Found by personal/public knowledge
Found by informal network contact	4022	4773
Found by institutional contact		3584

The nature and direction of those differences are not easily interpretable. As an example, consider the variable, communication pathways:

	Supersets associated with job found by		
	Informal network	Institutional contact	Personal/public knowledge
Low communication pathways (1-3)	63 (10%)	66 (18%)	59 (10%)
Moderate communication pathways (4-6)	227 (33%)	79 (22%)	151 (26%)
High communication pathways (7+)	398 (58%)	223 (61%)	385 (65%)

Note that the major difference is that the sets associated with jobs found by informal networks have proportionately more links with a "moderate", not a "low" or a "high", pathway count. This makes sense, in that a network set in which there is little communication would not be a good medium to carry job information; on the other hand, a set in which all participants knew one another might have such density that they all have the same job information. So, a moderately dense network in terms of communication pathways might, indeed, be most efficient for finding jobs. Our data are not clear proof of this, but they are consistent with it.

C. On the Orderliness of Job Histories. No significant differences were found in the network sets of those respondents whose series of jobs showed "chaotic" leaps from one kind of job to another and the sets of those whose jobs were related to one another in an "orderly" career. Of course, the careers that we have to compare are all very brief because of the youth of our sample; and the fact that they were all recently involved in an educational experience must have homogenized the sample somewhat. We don't really have any conclusive evidence to present on the subject of the relationship between social network and the orderliness (or lack thereof) of job histories. Some of the jobs that appear to represent "chaotic" leaps were found through informal contacts, some through personal/public knowledge; the same is also true of orderly changes in jobs.

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Appendix A

CONFIDENTIAL, for research purposes only. Employment-Networks Project
Department or Anthropology
University of Wisconsin-Milwaukee

SURVEY SCHEDULE ON EMPLOYMENT AND PERSONAL NETWORKS

Name and address on file.

Interviewer:

Respondent Identification code number	(1:1-5)	_ _ _ _ _
Card number	(1:6)	_
System Identification number	(1:7-9)	_ _ _
Source Identification number	(1:10-12)	_ _ _
Coder Identification number	(1:13-15)	_ _ _
Information date	(1:16-20)	_ _ _ _ _
Sex of respondent (1) male, (2) female	(1:21)	_
Age of respondent in years	(1:21-23)	_ _ _

1. Marital status?
   (1) single
   (2) married
   (3) divorced
   (4) separated
   (5) widowed (1:24) _

2. Years of schooling?
   (12) high school diploma earned
   (16) college degree earned (1:25-26) _ _

3. Still attending school?
   (1) no
   (2) yes (1:27) _

4. Current or most recent job: describe in detail, job, rank, industry, firm, to permit D.O.T. coding:
   D.O.T. code (1:28-33) _ _ _ _ _ _
   Prestige code (1:34-35) _ _

5. Tenure in current or most recent job: from year, month to year, month.
   (1:36-40) _ _ _ _ _
   (1:41-45) _ _ _ _ _

6. Satisfaction in job.
   Minnesota Satisfaction Questionaire, short form (1:46-65) _ _ _ _ _
   _ _ _ _ _
   _ _ _ _ _
   _ _ _ _ _

7. Results of M.S.Q.: (1:66-71) _ _ _ _ _ _

RESTRICTED: FOR RESEARCH USE ONLY.

MINNESOTA SATISFACTION QUESTIONNAIRE
Short Form, after 1967

Code: (1) not satisfied: (2) only slightly satisfied; (3) satisfied; (4) very satisfied; (5) extremely satisfied, with this aspect of the job.

1. Being able to keep busy all the time.....1 2 3 4 5
2. The chance to work alone on the job.....1 2 3 4 5
3. The chance to do different things from time to time.....1 2 3 4 5
4. The chance to be "somebody" in the community.....1 2 3 4 5
5. The way my boss handles his men.....1 2 3 4 5
6. The competence of my supervisor in making decisions.....1 2 3 4 5
7. Being able to do things that don't go against my conscience.....1 2 3 4 5
8. The way my job provides for steady employment.....1 2 3 4 5
9. The chance to do things for other people.....1 2 3 4 5
10. The chance to tell people what to do.....1 2 3 4 5
11. The chance to do something that makes use of my abilities.....1 2 3 4 5
12. The way the company policies are put into practice.....1 2 3 4 5
13. My pay and the amount of work I do.....1 2 3 4 5
14. The chances for advancement on this job.....1 2 3 4 5
15. The freedom to use my own judgment.....1 2 3 4 5
16. The chance to try my own methods of doing the job.....1 2 3 4 5
17. The working conditions.....1 2 3 4 5
18. The way my co-workers get along with each other.....1 2 3 4 5
19. The praise I get for doing a good job.....1 2 3 4 5
20. The feeling of accomplishment I get from the job.....1 2 3 4 5

8. (If this job has terminated) How did this job end?
   (1) R quit
   (2) R was let go individually
   (3) general lay-off
   (4) installation closed
   (5) transfered (1:72) _

9. How was this job found? (1) institutional contact
   Name:
   Agency: Identification no.
   (2) informal contact
   Name:
   Relationship: Identification no.
   (3) personal knowledge
   specify: (1:73) _

(IF PERSON IS NAMED GET LINK INFORMATION HERE).

10. Are)were) there people on this job, working at the same place, who are your relatives: (1) no
    (2) yes (1:74) _

    Who are they, and how are they related to you?

Name	Relationship	ID no.

(USE CONTINUATION SHEETS WHEN NECESSARY)

11. Are (were) there people on this job, working at the same place, whom you consider to be friends, or buddies?
    (1) no
    (2) yes (1:75) _

    Who are they, and what do you consider their relationship to you to be?

Name	Relationship	ID no.

(GET LINK INFORMATION FOR ALL PERSONS NAMED)

12. How many people live in your present household, including yourself, all adults, all children? (1:76-77) _ _

Who are they, and how are they related to you?

Name	Relationship	ID no.

(GET LINK INFORMATION FOR ALL PERSONS NAMED)

12a. Do you identify with any particular ethnic group in the U.S.A.? If so, what group? (1:78) _

12b. Where did your ancestors come from? How long ago?

Respondent Identification	(2:1-5)	_ _ _ _ _
Card no.	(2:6)	_
System Identification no.	(2:7-9)	_ _ _
Source Identification no.	(2:10-12)	_ _ _
Coder Identification no.	(2:13-15)	_ _ _
Blank column	(2:16)	_

13a. Did you graduate from the training institute?

(1) no
(2) yes (2:17) _

13b. You graduated from the Institute in (yr.)____(mo.)____
(code year, date) (2:18-22) _ _ _ _ _

14. While you were there did you have friends or relatives there at the same time?
(1) no
(2) yes (2:23) _

Who were they and what was your relationship to them at the time?

Name	Relationship	ID no.

(GET LINK INFORMATION ON PERSONS NAMED)

15. Were any of the personnel at the Institute particularly helpful to you?
(1) no
(2) yes (2:24) _

Who were they, and what was their relationship to you? Teacher, counsellor?

Name	Relationship	ID no.

(GET LINK INFORMATION ON PERSONS NAMED)

16. Are there any people whom you remember well from the Institute that you do not see now (not counting those mentioned above)?
(1) no
(2) yes (2:25) _

Who are they, and what was their relationship to you then?

Name	Relationship	ID no.

(GET LINK INFORMATION ON PERSONS NAMED)

17. Did you know any of those people we've just been talking about, the ones you knew at the Institute, before you attended the Institute?

(1) no
(2) yes (2:26) _

Which ones? What are the relationships?

Name	Relationship	ID no.

(GET EARLIER PHASE LINK INFORMATION ON PERSON NAMED)

18. How did you first learn about the Institute?

(1) Institutional contact
Name:
Agency: ID no.
(2) Informal contact
Name:
Relationship ID no.
(3) Personal knowledge
Specify (2:27) _

(GET LINK INFORMATION ON PERSON NAMED)

19. With whom did you discuss the possibility of attending the Institute?

Name	Relationship	ID no.

(GET LINK INFORMATION ON PERSONS NAMED

20. Are there some persons with whom you purposely avoided discussing the possibilities of attending the Institute?

(GET LINK INFORMATION ON PERSONS NAMED)

21. We have talked about your (recent) job. Now let's talk about the job you had just previous to that one. (Get the following information for at least three jobs, prior to the period spent at the Institute.) (Use continuation forms if necessary.)

	Penultimate job	Earlier job	Still earlier job
Job description in detail, job, rank, industry, firm.	*	*	*
	*	*	*
	*	*	*
	*	*	*
	*	*	*
	*	*	*
		*Instructions to key puncher: Duplicate *cols. 1-5 from Card 2, punch 3 in col.6 *for Card 3 and 4 in col. 6 for Card 4, *duplicate cols. 7-15 from Card 2, then *skip to col. 28.	
DOT code.	(2:28-33)_ _ _ _ _ _	(3:28-33)_ _ _ _ _ _	(4:28-33)_ _ _ _ _ _
Prestige Code.	(2:34-35)_ _	(3:34-35)_ _	(4:34-35)_ _
Tenure, from yr.,da. to	(2:36-40)_ _ _ _ _	(3:36-40)_ _ _ _ _	(4:36-40)_ _ _ _ _
yr., da.	(2:41-45)_ _ _ _ _	(3:36-40)_ _ _ _ _	(4:41-45)_ _ _ _ _
Minnesota Satisfaction Questionaire	(2:46-65)_ _ _ _ _	(3:46-65)_ _ _ _ _	(4:46-65)_ _ _ _ _
	_ _ _ _ _	_ _ _ _ _	_ _ _ _ _
	_ _ _ _ _	_ _ _ _ _	_ _ _ _ _
	_ _ _ _ _	_ _ _ _ _	_ _ _ _ _
Results	(2:66-71)_ _ _ _ _ _	(3:66-71) _ _ _ _ _ _	(4:66_71)_ _ _ _ _ _

Termination:
(1) R quit
(2) R was let go
(3) general lay-off
(4) closed
(5) transferred

(2:72) _ (3:72) _ (4:72) _

How was job found?
(1) Institutional
name:
agency:
(2) Informal
name:
relationship
ID
(3) Personal knowledge
specify:

(2:73) _ (3:73) _ (4:73) _

22. Were there people on this job who are your relatives?

(2:74) _ (3:74) _ (4:74) _

Name,relationship,ID	Name,relationship,ID	Name,relationship,ID
*	*	*
*	*	*

23. Were there people on this job you consider friends?

(2:75) _	(3:75) _	(4:75) _
Name,relationship,ID	Name,relationship,Id	Name,relationship,ID
*	*	*
*	*	*
*	*	*
*	*	*

(GET LINK INFORMATION ON ALL PERSON NAMED)

So far we have talked about a number of people who have some bearing on your job or home. Now let's talk about other kinds of relationships.

24. What two persons would you go to for advice on important personal matters?

Name	Relationship	ID no.
*	*	*
*	*	*

25. What two persons might seek advice from you on matters of importance to them?

Name	Relationship	ID no.
*	*	*
*	*	*

(GET LINK INFORMATION ON PERSONS NAMED)

26. Have we already listed five relatives, who live outside your household? If not, name enough so that we have at least that number.

Name	Relationship	ID no,
*	*	*
*	*	*
*	*	*
*	*	*
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27. Have we already listed 5 persons you would characterize as friends? If not, name enough so that we will have at least that number.

Name	Relationship	Id no.

(GET LINK INFORMATION ON PERSONS NAMED)

28. Are there persons whom you feel are important to you whom we have not listed?

Name	Relationship	ID no.

(GET LINK INFORMATION ON PERSON NAMED)

CHARACTERISTICS OF LINKS*

(AFTER GETTING IDENTIFICATION OF PERSONS LINKED GET INFORMATION ON THE RELATIONSHIP BY FOLLOWING THESE GUIDING QUESTIONS. AVOID REDUNDANCY. IF INFORMATION IS ALREADY KNOWN, DO NOT ASK QUESTION.)

i. Kinship: Is there a relationship of kinship, consanguinity or affinity: (1) No; (2) Yes.

1. Dependence of this link on others: Is your relationship with this person dependent on another relationship? Would you continue to relate to this person regardless of what happened to other relationships?

2. Dependence of other links on this one: Are there any other relationships that exist merely because of your relationship with this person?

3. Communication pathways: Are there more than seven other people through whom you can communicate with this person? How many "third parties" are there who know both you and this person?

4. Uniqueness: Is the relationship you have with this person common in your experience, or is this relationship the only one of its kind that you have? Is it the only one of its kink for this person?

5. Functional diffuseness: Does your relationship with this person cover many aspects of your lives, or is it rather restricted to certain activities only?

6. Hierarchical status imbalance: Do other people think of you and this person as being very different social standing, one of you higher the other lower? Or are you considered to be about the same status in the community at large?

7. Inequality of rights and duties: Do you, or ought you, do much more for this person than this person does for you? Does this person, or should this person do much more for you than you do for this person? If there is not clear inequality in mutual obligations, perhaps what you do for one another is different enough that it is difficult to say whether there is equality between you. What do you consider you otght to do in rlation to that person? What ought that person do in relation to you?

8. External sanctions: Are other people concerned that you live up to your obligations toward this person and that he/she live up to his/her obligations toward you? Or, at the other extreme, do other people think you ought not maintain this relationship? (Positive concern by others is coded 9; negative concern by others is coded 1; lack of concern by others is coded 5.)

9. Situational contingency: Does your relationship with this person change depending on the circumstances in which you find yourselves? Do you behave toward one another in one way in one place (or time) and then another way at another place (or time)?

10. Structuring: Is your relationship with this person formally patterned, so that each knows just what is expected? Or is there no agreed upon set of rights and obligations, so that you have to decide how to behave on each occasion of interaction.

11. Frequency: How often do you communicate with this person? (1,no more than once a year; 2,twice a year; 3,three times a year; 4,once a month; 5,once a week; 6,work days, as coworker only; 7,work days, but more than just coworker; 8,every day, but not in same household; 9,everyday, as in family, household.)

*Variables 1 through 10 are described more fully in "Toward Structural Comparisons of Networks," Wolfe, 1970.